Treatment of Metals via Water Reclamation Facilities

Presented to Spokane River WAG
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Jun 14, 2016

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Utilities Division

Summary

- Sources
- Physical Removal
- Settling
- Biological Removal
- Filtration
- Chemical Removal

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The **BOLD** Print

- **<u>All</u> calculations, values, and graphs are approximate and for illustrative purposes only.**

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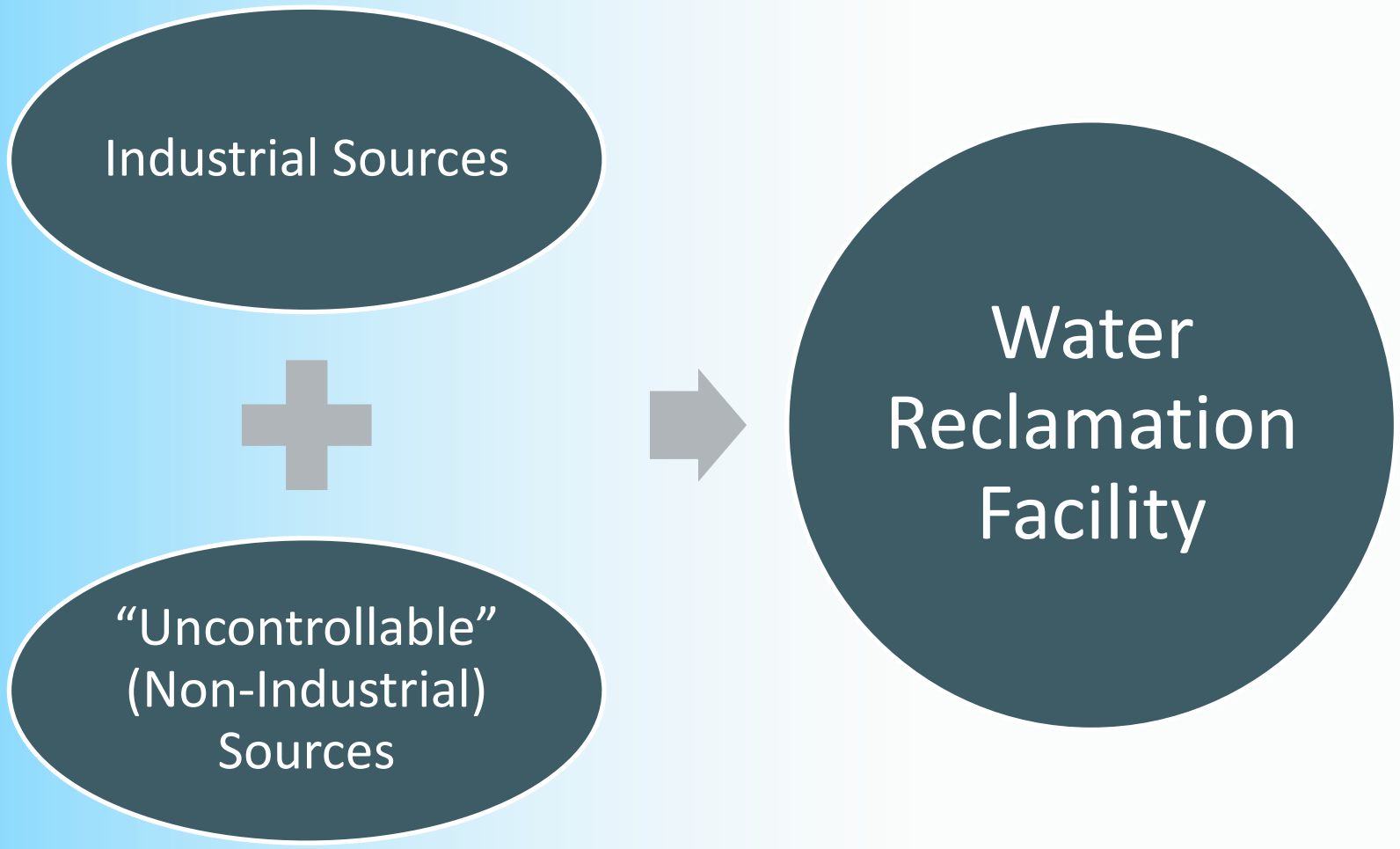
Sources to Facilities



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Industrial Sources

- Various Categories (Medical, Metal Finishers, etc.)
- Federally Regulated, often delegated locally
- In Post Falls: Buck Knives, Kimball Office (closed), ALK-Abello, Burly Products

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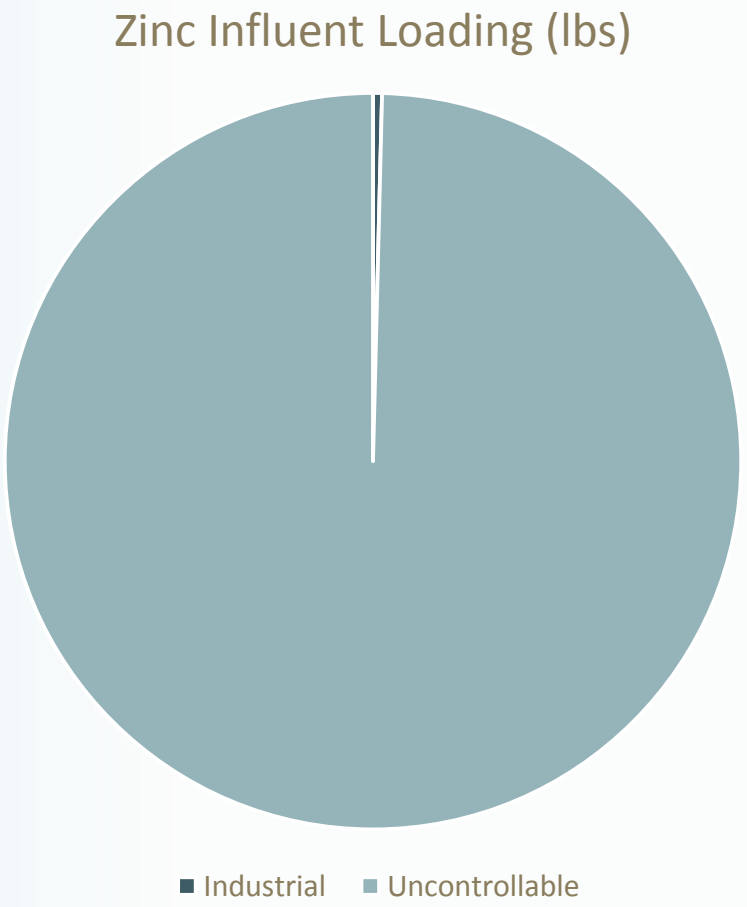
“Uncontrollable”

- Non-federally regulated
- Generally residential
- Zinc Concentration in Post Falls:
  - 147 µg/L Background
  - 177 µg/L Industrial
    - (Now Lower)



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Treatment

- In general:
  - Water Reclamation Facilities are not usually specifically designed to remove metals
  - Better removal of non-dissolved (particulate) metals

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  - Water Reclamation Facilities are not usually specifically designed to remove metals
  - Better removal of non-dissolved (particulate) metals than dissolved

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Preliminary Treatment

- Removes trash and grit
- Uses screens and gravity separation
- Primary goal is equipment preservation

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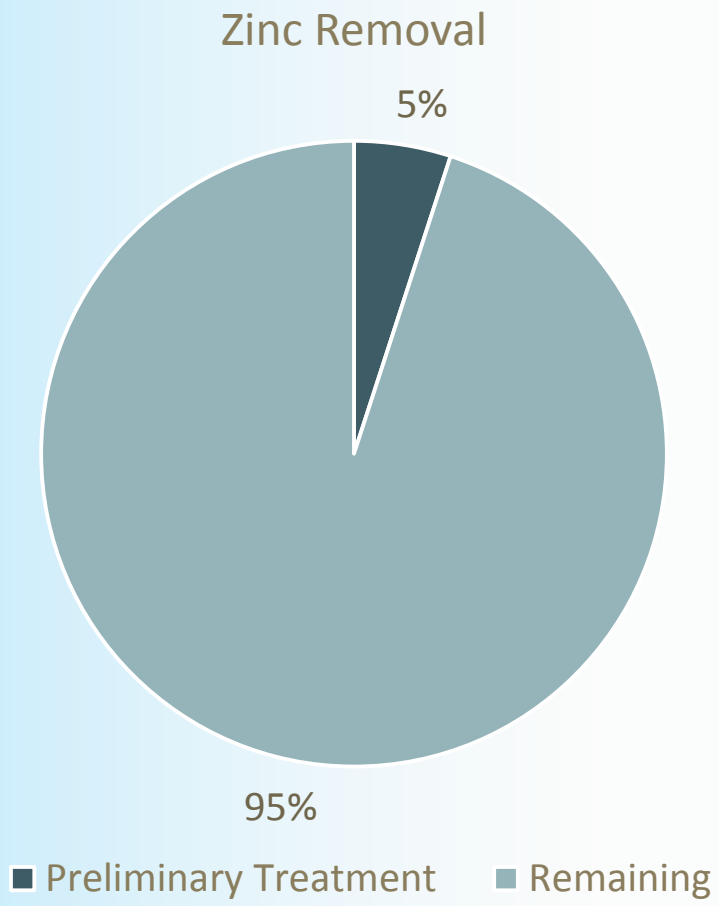
Preliminary Treatment



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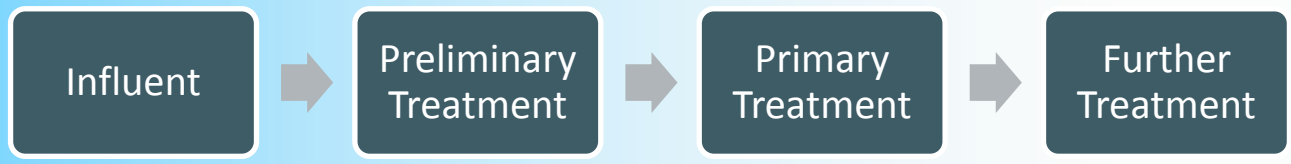
Primary Treatment

- Settling Basins (Clarifiers) for Gravity Separation
- Removes around 50% of nutrients
- Removes 10-25% of metals



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Primary Treatment

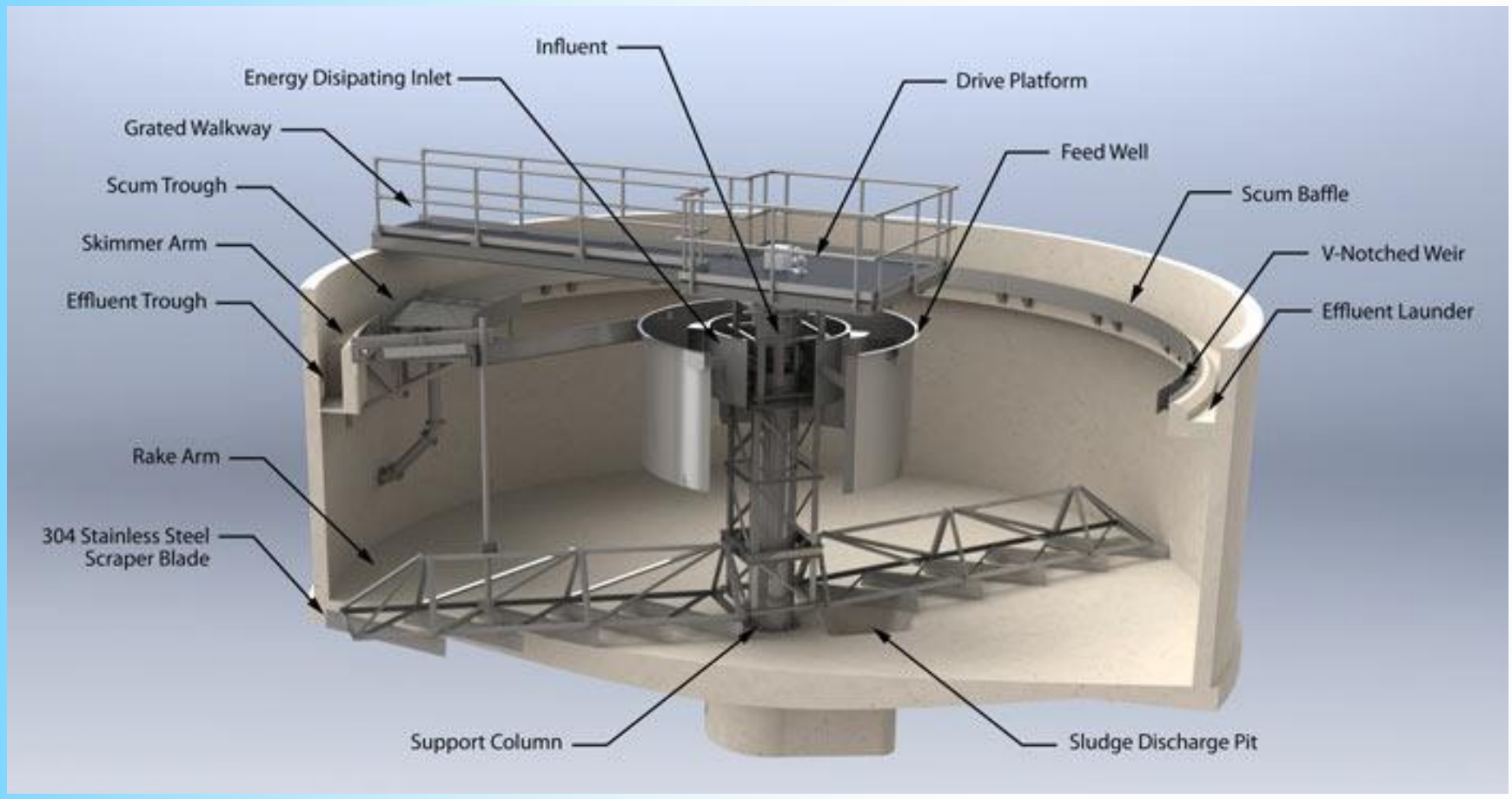

Photo: Monroe Environmental

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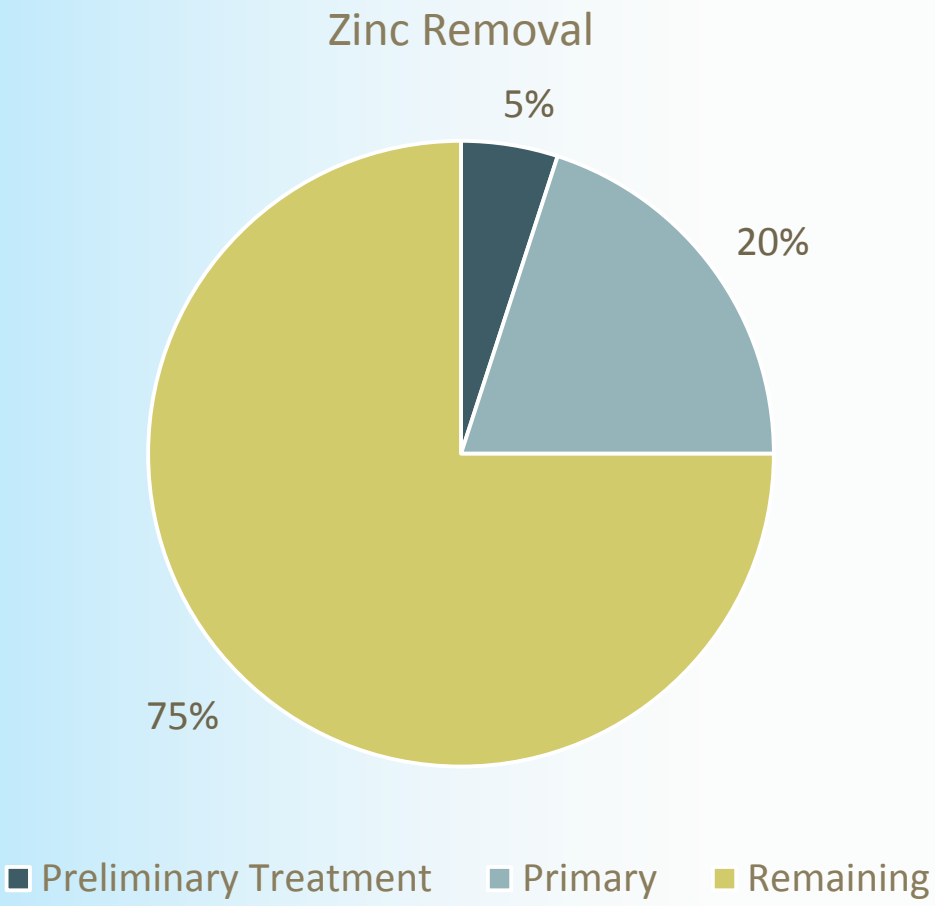
Primary Treatment



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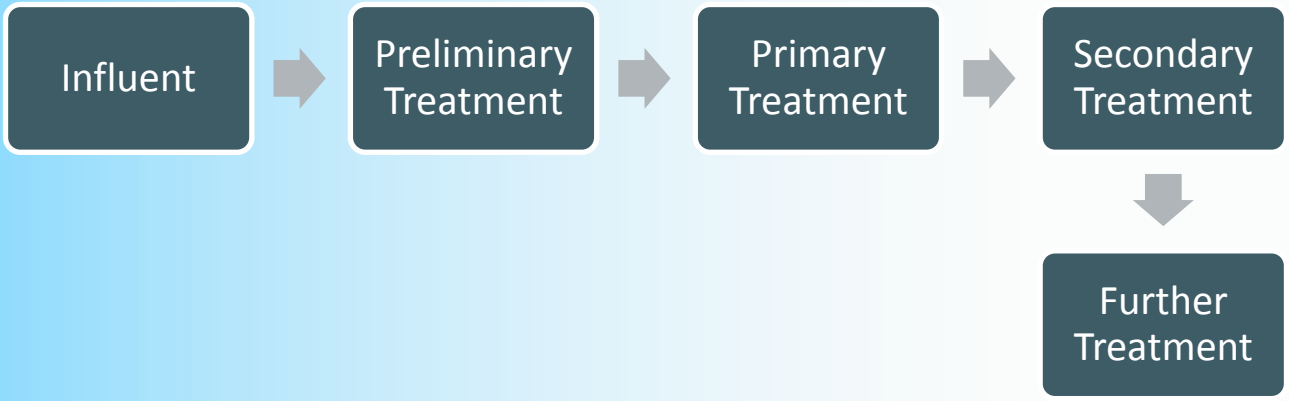
Secondary Treatment

- Biological Removal of Nutrients
- Oxygen provided to microbes
- Microbes use oxygen and nutrients to grow
- Microbes removed
- Metals Removal: 58-66% of influent (at Post Falls)



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Secondary Treatment

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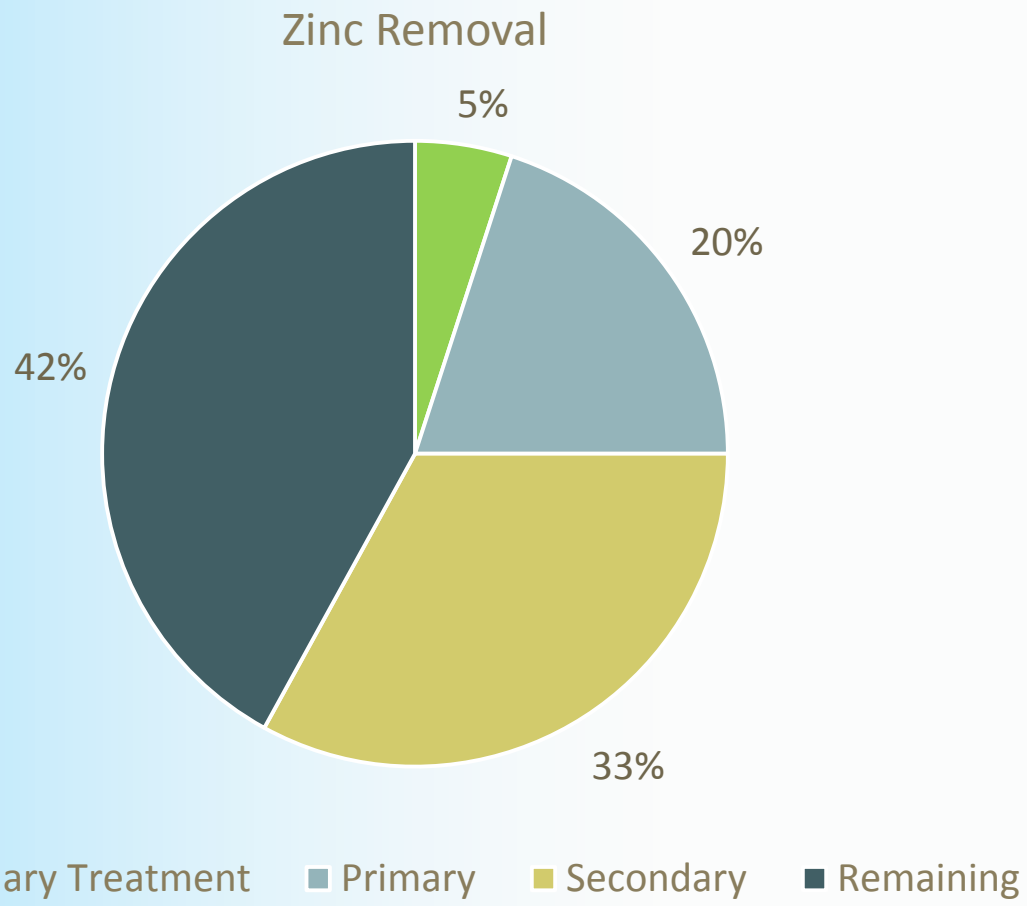
Secondary Treatment



Source: 2015 Post Falls Local Limits Study

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Secondary Treatment

This is where we are today.

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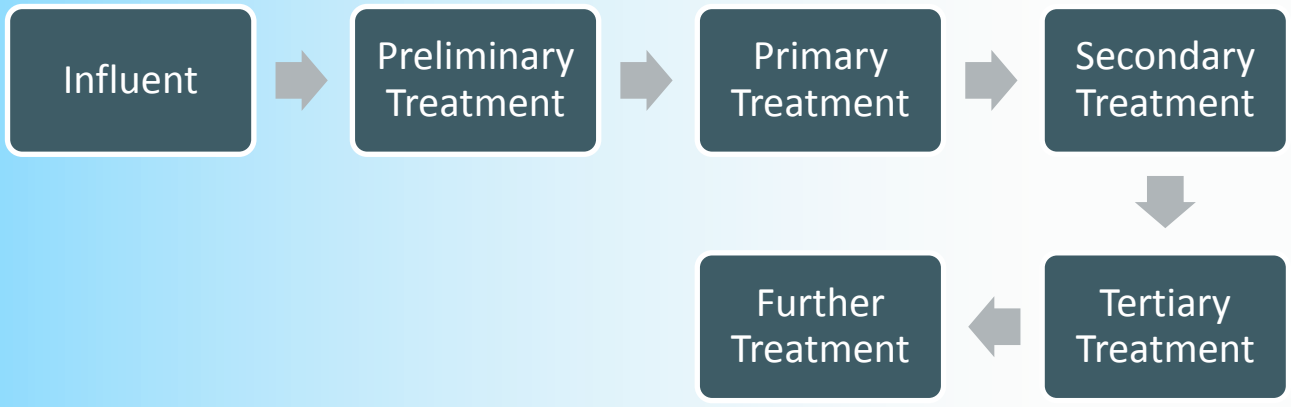
Tertiary Treatment

- Fine Filtration of Secondary Effluent
- Removes particulate matter
- Membrane pore sizes range 0.002 to 10 microns
- Dissolved metals not removed
- ~8% incremental removal



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Tertiary Treatment

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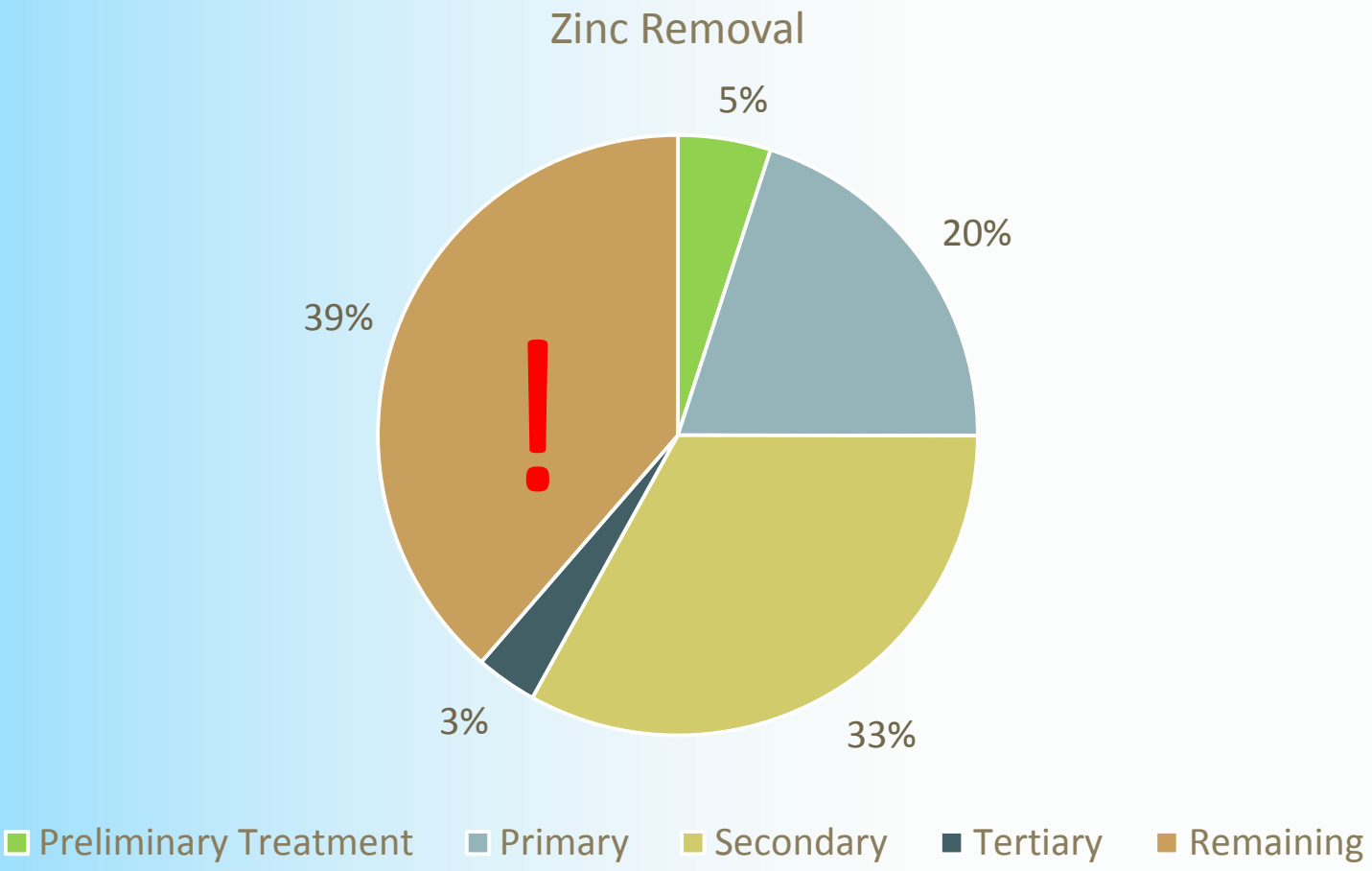
Tertiary Treatment



Source: 2013 Post Falls Facility Plan

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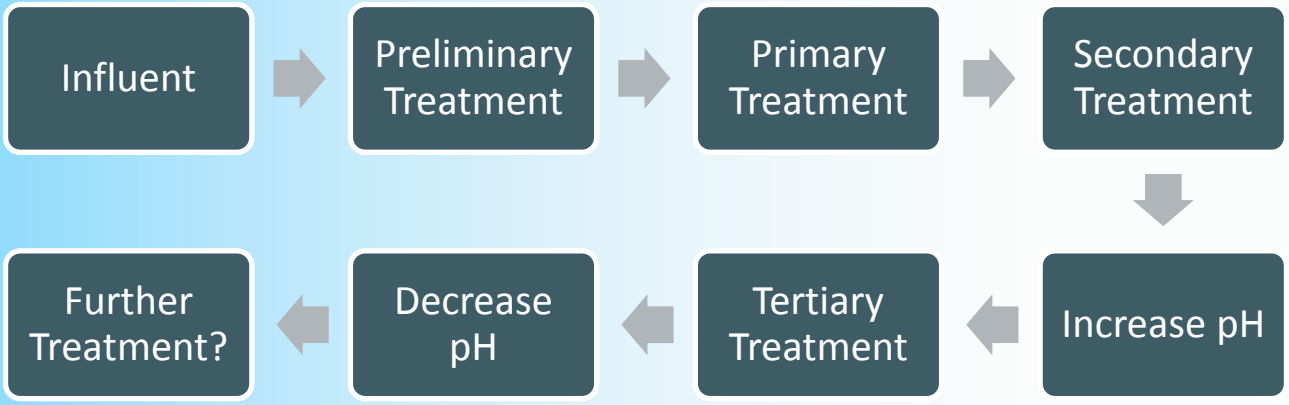
Tertiary Treatment with pH Adjustment

- Retain Fine Filtration of Secondary Effluent
- Adjust pH to ~10.0 to precipitate metals
- Filter
- Re-Adjust pH to meet effluent limits (<9.0)
- 90% incremental removal



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Tertiary Treatment w/ pH Adjust

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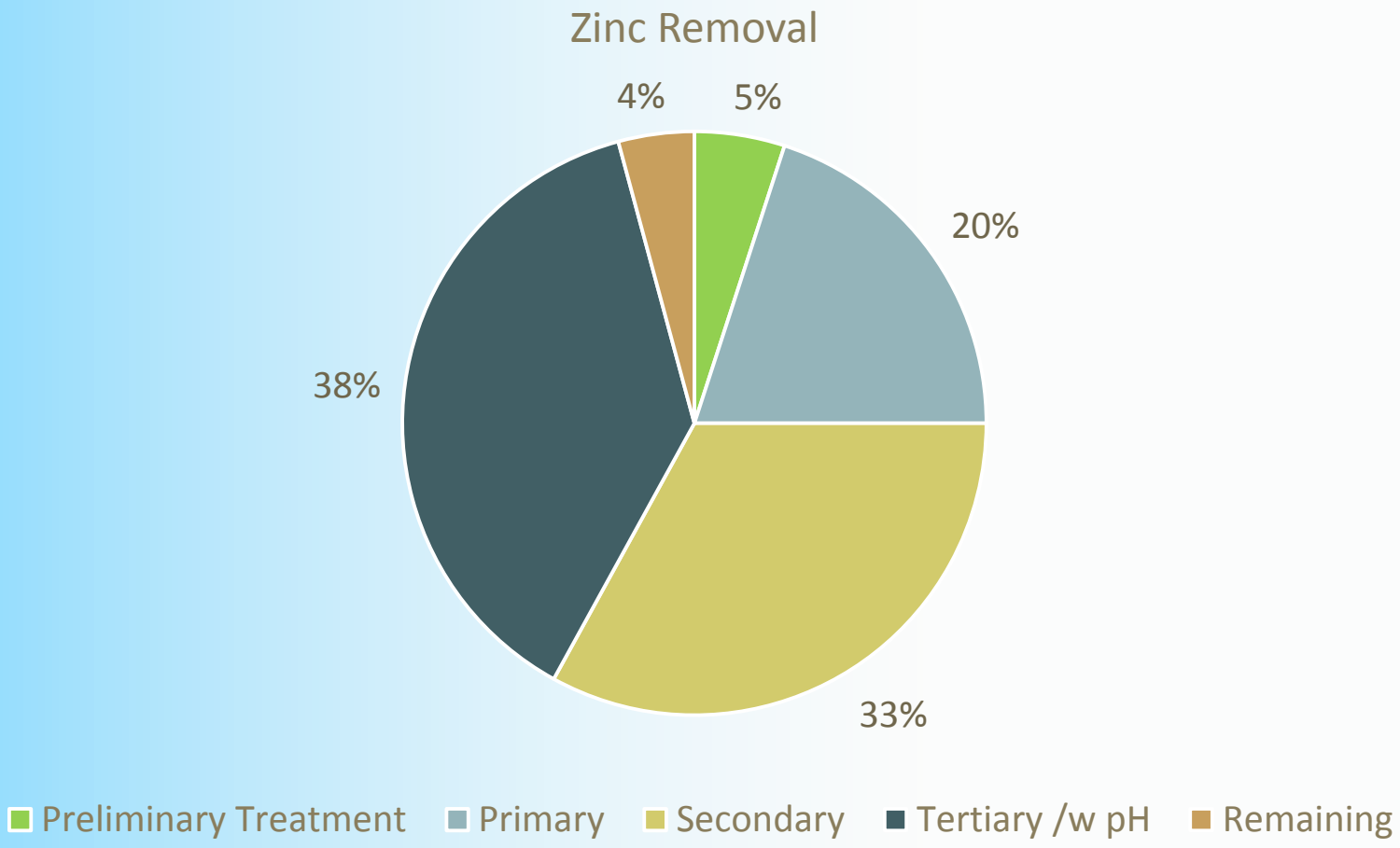
Tertiary Treatment /w pH Adjust



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Questions

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